

Si85xx UNIDIRECTIONAL AC CURRENT SENSOR TARGET BOARD USER'S GUIDE

The Si85xx products are unidirectional ac current sensors available with full scale current sense input ranges of 5, 10, and 20 A. Si85xx products are ideal upgrades for older current-sensing technologies offering size, performance and cost advantages over current transformers, Hall Effect devices, DCR circuits, and other approaches. The Si85xx are extremely low-loss, adding less than 1.3 m Ω of series resistance and less than 2 nH series inductance in the sensing path at 25 °C. Current-sensing terminals are isolated from the other package pins to a maximum voltage of 1,000 VDC.

1. Kit Contents

The Si85xx Unidirectional AC Current Sensor Development Kit contains the following items:

- 10 Amp Si8512 based evaluation board
- Si85xx Unidirectional AC Current Sensor Target Board User's Guide (this document)

2. Hardware Overview

The Si85xx Target Board (Si85xx-TB, see Figure 1) provides a means to evaluate the ac current sensor in an existing application. It is meant to be soldered directly into the users existing power supply. The board comes with the Si8512 installed and provides a 10 Amp full scale input sense range and a 2.0 V full scale output voltage. For more details on the Si8512, refer to the Si85xx Data Sheet.

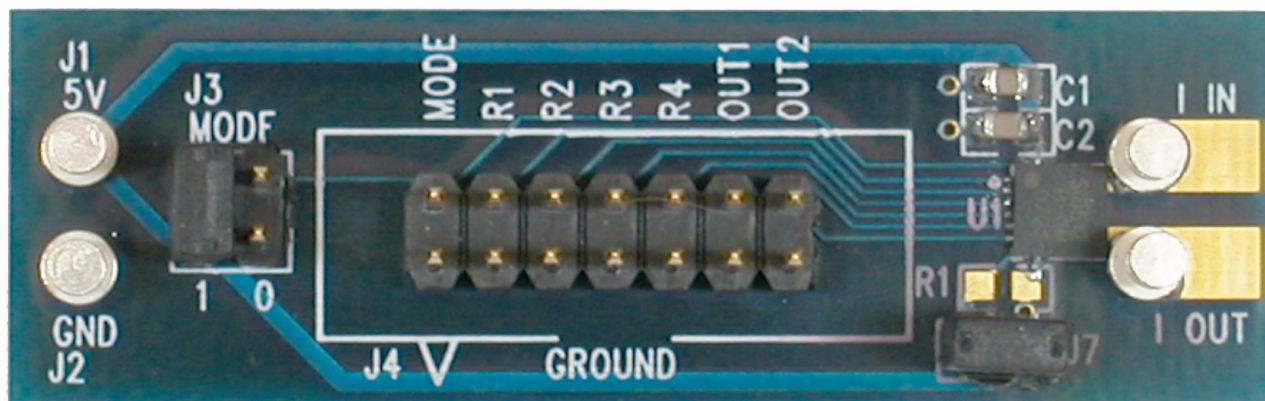


Figure 1. Si85xx-TB Overview

3. Si85xx-TB Hardwired to Single-Phase POL

Figure 2 illustrates the Si85xx-TB soldered directly into a single-phase POL. The single phase POL was designed to operate at a 400 kHz switch rate and provide better than 90 percent efficiency. It also provides 10 amps of peak current to the load and protects the supply by shutting down in the event of an over current condition.

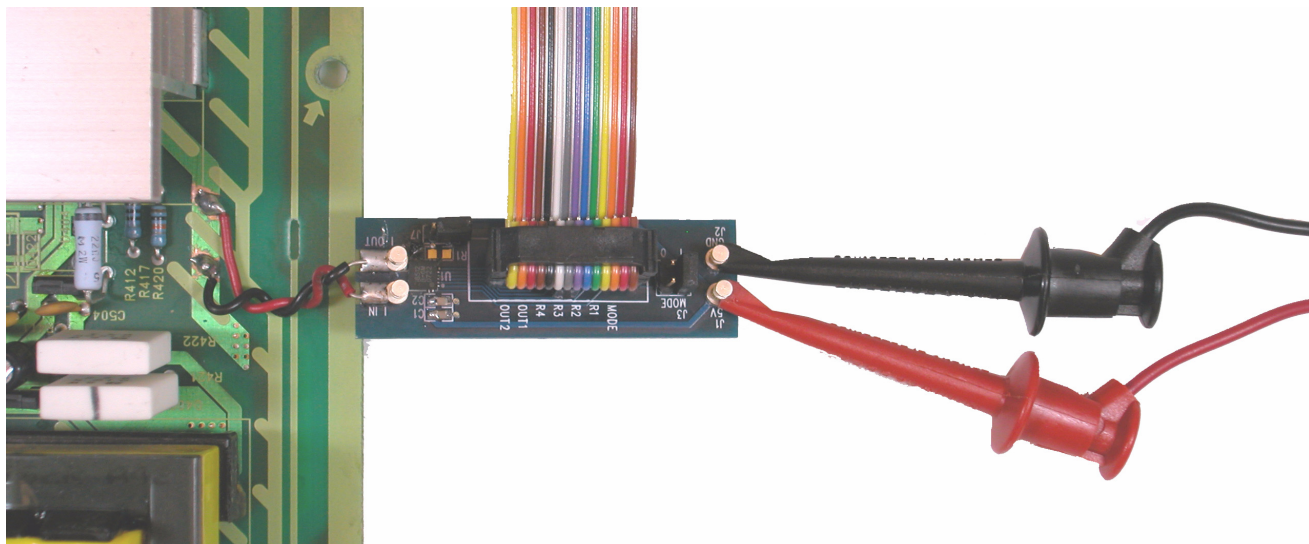


Figure 2. Si85xx-EVB Hardwired to Single-phase POL

Figure 3 illustrates the Si8512 accurately monitoring the POL's switching current. As shown in the scope plot, a 1.6 V peak output voltage accurately monitors the 8 Amp peak, 50 percent duty cycle, 400 kHz current signal of the POL. A 20 mΩ sense resistor in series with the Si85xx is also monitored via a differential probe to provide a base-line measurement of the POL.

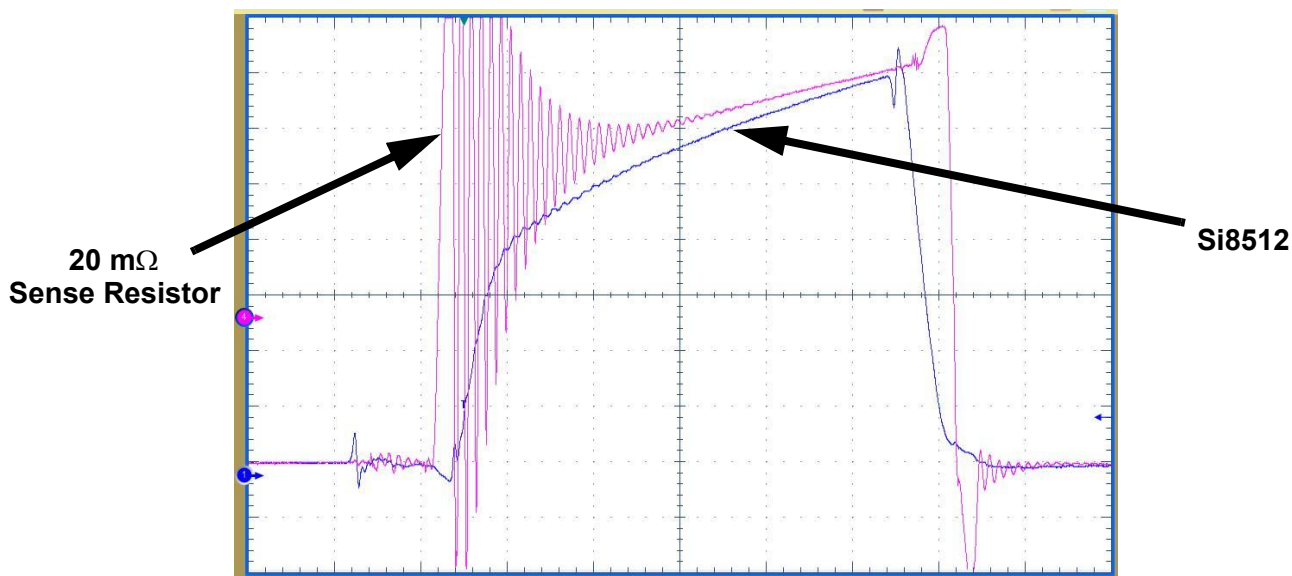


Figure 3. Si85xx-TB OUT1 Oscilloscope Plot

To accommodate this test, the Si85xx-TB was powered with a 5 V (100 mA) supply connected from J1 to J2. R1 was soldered from J4 to the respective phase control line of the POL. R2 and R4 were jumped to GND on J4. R3 was tied to 5 V and the Mode pin was jumped to VDD via J7.

4. Si85xx Evaluation Board

The Si85xx-TB has a Si8512 installed. Refer to Figure 4 for the locations of the various I/O connectors and major components.

- J1 5 V Supply Input power connection 5 V, 100 mA
- J2 GND, Input Supply power return connection, 0 V
- J3 HDR-2X2, Mode Control input
- J4 HDR-2X07, R1, R2, R3, R4 inputs, OUT1, OUT2 outputs, and seven GND return pins
- J5 IIN Positive Current Sense Input
- J6 IOOUT Negative/return Current Sense Input
- J7 HEADER, TRST timing select jumper, default tied to VDD

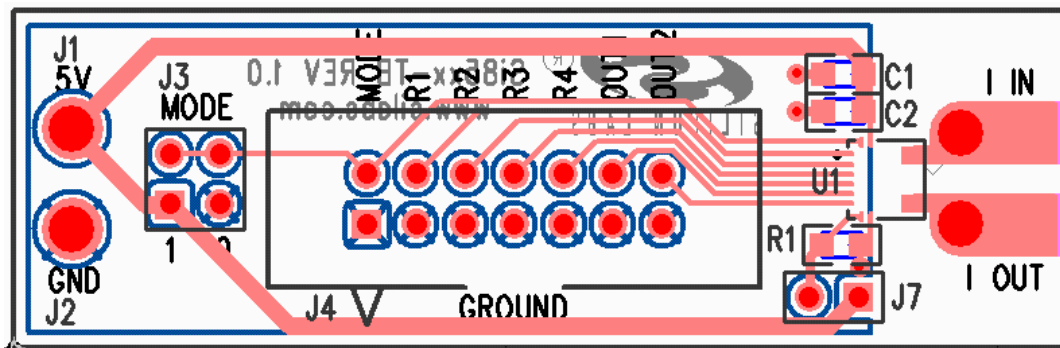


Figure 4. Si85xx-TB Layout

4.1. VIN (J1, J2)

The user-provided power supply should be connected to connectors J1 and J2 where J2 is the reference. The power source must be 5 V with at least 100 mA maximum output current.

Table 1. J1, J2 Pin Descriptions

Jumper #	Description
J1	5 V, 100 mA
J2	GND

4.2. Mode Pin (J3)

Connector J3 is the Mode Control header. The user should tie this pin to either VDD or GND depending on their power supply.

Table 2. J3 Pin Descriptions

Jumper #	Description
J3	VDD or GND

4.3. R1, R2, R3, R4 Inputs, OUT1, OUT2 Outputs (J4)

Connector J4 is used to provide the control inputs (R1, R2, R3, R4, MODE) to the Si85xx. It also provides the output voltage of the sensed input current on OUT1 and OUT2.

Table 3. J4 Pin Descriptions

Jumper #	Description
J4	R1, R2, R3, R4, OUT1, OUT2, GND

4.4. IIN (J5)

Connector J5 is used to provide the positive current sense input to the Si85xx device.

Table 4. J5 Pin Descriptions

Jumper #	Description
J5	IIN

4.5. IOUT (J6)

Connector J6 is used to provide the negative/return current sense input to the Si85xx device.

Table 5. J6 Pin Descriptions

Jumper #	Description
J6	IOUT

4.6. TRST RESET (J7)

Connector J7 is used to set the timing for the Si85xx's integrator. J7 defaults to Reset option 1 where TRST is tied VDD providing approximately 200 ns of reset time. Reset option 2 is selected by connecting a timing resistor (R1 in Figure 4) from the TRST input to ground.

Table 6. J7 Pin Descriptions

Jumper #	Description
J7	TRST – VDD or R1 to GND

5. Schematic

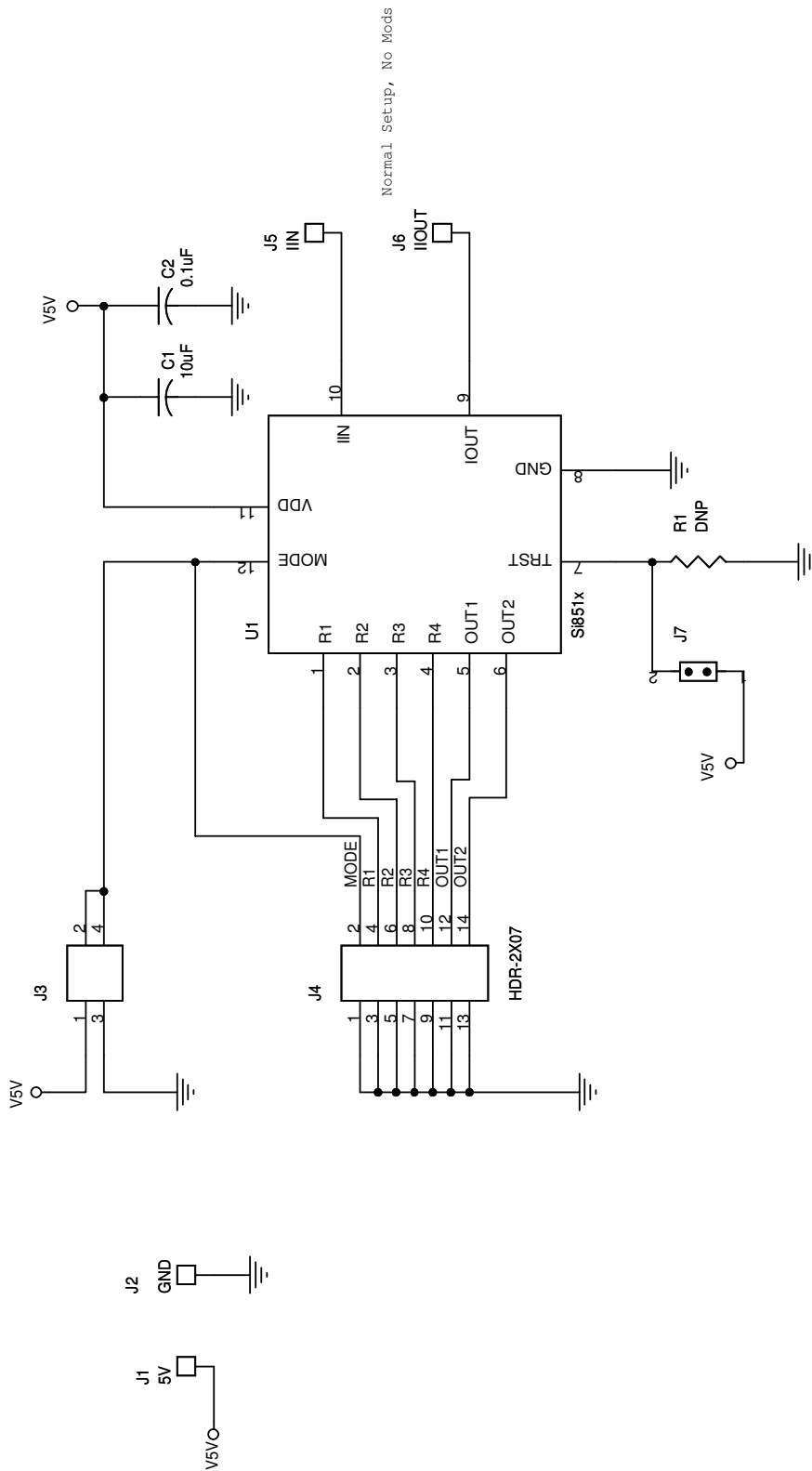


Figure 5. Si85xx Target Board Schematic

Si85xx-TB UG

6. Bill of Materials

Table 7. Si825x Multi-Phase POL Reference Design Bill of Materials

Item	Quantity	Reference	Part Number	Manufacturer	Description
1	1	C1	PCC2182CT-ND	Digi-Key	10 uF
2	1	C2	PCC1812CT-ND	Digi-Key	0.1 uF
3	1	J1	2551-2-00-44-00-00-07-0	Bisco	5 V
4	1	J2	2551-2-00-44-00-00-07-0	Bisco	GND
5	1	J3	S2012-02-ND	Digi-Key	HDR-2X2
6	1	J4	S2012-07-ND	Digi-Key	HDR-2X07
7	1	J5	2551-2-00-44-00-00-07-0	Bisco	IIN
8	1	J6	2551-2-00-44-00-00-07-0	Bisco	IIOUT
9	1	J7	S1012-02-ND	Digi-Key	HEADER
10	1	R1	P150CCT-ND	Digi-Key	DNP
11	1	U1	Si8512-IS	Digi-Key	Si851x

NOTES:

Si85xx-TB UG

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